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ABSTRACT

This publication is intended to provide educators and business leaders with examples of school-to-career activities that use computer-based and other technologies to enrich and enhance learning about the world of work. The five specific topics are as follows: (1) school-to-career partnerships; (2) bringing the world of work to the classroom; (3) technology and active learning experiences; (4) professional development for teachers; and (5) systemic school-to-career initiatives. Each section of this publication describes ways in which technology can be a partner to support student achievement and prepare young people with skills they will need to succeed in the workplace. For easy reference, a contents page precedes each section, highlighting key topics of interest to business leaders and educators. Wherever possible, website addresses are provided for these programs. A resources list is appended to assist in contacting 33 organizations cited in the publication. (YLB)

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ED 428 182

School-to-Career Programs and Technology

Partnerships for Student Success

CE078156

IBM

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DEAR READER:

In December 1997, IBM and the DeWitt Wallace-Reader's Digest Fund held a forum on school-to-career programs and technology that brought together leading practitioners and policy makers from around the nation. This was one of a series of forums IBM held during the year to generate ideas and action on how technology can address specific education and community issues.

Participants reviewed the ways in which technology is currently being used in school-to-career programs and considered how technology could be incorporated more effectively to improve student achievement. The discussion strengthened our conviction that investments in technology that are appropriately planned and delivered can support educational reforms that prepare young people to think critically, develop in-depth understanding, and apply academic learning to every aspect of their daily lives, including the world of work. At the same time, participants stressed three important aspects in realizing the potential of computers and other technologies to enhance teaching and learning: linking technology to high academic standards; providing teachers and administrators with hands-on training in the use of these technologies; and making technology easily accessible to all constituencies.

We thank those who participated in and helped plan the forum, particularly Peter Kleinbard and the rest of the staff at the DeWitt Wallace-Reader's Digest Fund — the largest funder, among private foundations, of programs that support the career development of youth. We also thank Campbell-Kibler Associates, Inc. for preparing a working paper that helped shape our discussions. Finally, we would like to extend our appreciation to the people in the education and business community who told us about the many school-to-career programs across the nation.

Our hope is that this publication will assist schools, businesses and community-based organizations in their efforts to develop, enrich or expand their school-to-career partnerships — and ultimately strengthen the web of school-to-career programs for all students.

Sincerely,

Stanley S. Litow
Vice President
IBM Corporate Community Relations
President
IBM International Foundation

As a national and international employer, IBM supports education reform efforts that equip young people with the academic and applied learning skills they need to succeed in today's and tomorrow's workplace. Whether students seek employment after postsecondary education or immediately after high school, it is critical to the future of our economy that they have the skills, knowledge and learning experiences that employers consider important.

Many companies have excellent business partnerships with schools, and there is a wide range of exemplary school-to-career programs that are not yet incorporating technology in their efforts. This publication is intended to provide educators and business leaders with examples of school-to-career activities that use computer-based and other technologies to enrich and enhance learning about the world of work. It is not intended to serve as a comprehensive report on school-to-career partnerships, but to spark interest in these areas, providing a vision for what is possible when school-to-career programs and technology become partners for student success. Specific topics include:

School-to-Career Partnerships

Bringing the World of Work to the Classroom

Technology and Active Learning Experiences

Professional Development for Teachers

Systemic School-to-Career Initiatives

Using This Publication

Each section of this publication describes ways in which technology can be a partner to support student achievement and prepare young people with skills they will need to succeed in the workplace. For easy reference, a contents page precedes each section, highlighting key topics of interest to business leaders and educators.

We have included, wherever possible, Web site addresses for these programs. A resources list is included in the appendix, to help you contact organizations cited in this publication.

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IBM's interest in school-to-career issues is based on its belief in education reform. To help equip U.S. students with the academic, social and thinking skills required to perform well in today's workplace, IBM has made major commitments to education reform in the following areas:

Reinventing Education

IBM's $35 million educational initiative, launched in 1994, is designed to support fundamental school restructuring and broad-based systemic change to improve student performance in public schools. U.S. school districts and state departments of education received 21 grants which span a broad range of systemic reform issues and creative problem solving using innovative technological solutions. Individually, these projects exemplify very exciting ways to overcome specific barriers that have inhibited school reform, such as the length and structure of the school day and year, how learning is measured, and how language, math and science are taught. Collectively, these address nearly every aspect of the education agenda, from home-school communications, to data management and analysis, to classroom instruction, to teacher training, to student assessment. The program is now being expanded internationally in Vietnam, Ireland, Brazil and Italy.

Providing National Leadership for Student Achievement and School-to-Career Initiatives

In March 1996, IBM and the National Governors Association hosted the second National Education Summit attended by the President of the United States, 41 governors, 49 business leaders and 34 education leaders, to develop a joint strategy to align school achievement standards with skills required for work in today's economy. Outcomes of the summit included:

Student Achievement. Commitments made by business leaders to promote student achievement included the following: (1) a promise to change company hiring policies to include the review of transcripts or other school-based records, such as diplomas, skill certificates, or portfolios; (2) an agreement to make business location decisions based on the educational performance of states and localities; and (3) a commitment to focus education-related philanthropy on raising academic standards and improving student achievement. The governors agreed to implement high academic standards within two years for all students across the core curriculum, and to establish assessments and clear accountability systems.

Achieve, Inc. To monitor progress toward these and other commitments made at the Summit, an independent organization, Achieve, Inc., has been established to serve as a clearinghouse for information on state standards, assessments and accountability, enabling states and localities to compare, enhance and coordinate their efforts. www.achieve.org

New Hiring Criteria. Following the Summit, IBM changed its hiring criteria for entry-level manufacturing jobs to include high school transcripts for applicants who have fewer than five years of work experience. As a predictor of job success, the company conducted a nationwide analysis to determine the skills required — including communication, logical reasoning, and teamwork — in its entry-level manufacturing jobs. The research found that academic performance in certain subjects correlates with these skills. Further, courses like chemistry, physics, algebra and statistics are relevant to entry-level manufacturing jobs. As a result, IBM has developed a new employment application process that includes school transcripts as well as information on job experience and other relevant information. By June 1997, the process was being used in all of the company's manufacturing sites in the United States, including Texas, Minnesota, Vermont, North Carolina, New York and California.

Fostering Active Participation in Community-Based School-to-Career Programs

Like many other companies, IBM supports local school-to-career initiatives in partnership with other businesses, school districts, labor unions, community organizations, government agencies, teachers, administrators, parents and students. In states where our manufacturing sites are located, thousands of IBM employees participate as volunteers in a wide range of local school-to-career activities, such as job shadowing, speakers programs, tutoring, teacher internships and youth apprenticeships.

Finally, IBM has taken a strong leadership role in supporting the potential of technology to facilitate active learning that helps students develop their minds, promotes good teamwork, and instills effective communication — skills everyone needs to succeed in school and at work. www.ibm.com/ibm/ibmgives

School-to-Career Partnerships

Responding to Changing Workforce Requirements

High Academic Achievement for All Students

Technology and Student Achievement

Funding School-to-Career Programs

As a strategy for school reform, educators and business leaders are creating innovative partnerships that both address changing workforce requirements and stress high academic achievement for all students.

Stanley S. Litow
Vice President, IBM Corporate Community Relations
President, IBM International Foundation

IN 1991 at the U.S. Department of Labor, the Secretary's Commission on Achieving Necessary Skills (SCANS), comprising a group of prominent business, labor, education and government leaders, issued the landmark study, *What Work Requires of Schools: A SCANS Report for America 2000*. The report describes the types of changes occurring in the workplace that make traditional entry-level job skills insufficient or obsolete. For example, in the traditional model, work is routinized, repetitive and organized along hierarchical lines. In new "high performance" work environments, however, work is problem-oriented, flexible and organized in teams.

The SCANS report also identifies three broad areas of foundation skills and five workplace competencies needed for effective job performance in today's new work environments. They include basic academic skills, thinking skills and personal qualities, as well as such competencies as resource allocation; interpersonal skills; and information, systems and technology skills. The relevant SCANS skills have become a widely accepted benchmark for employer expectations of its entry-level workforce.

RESPONDING TO CHANGING WORKFORCE REQUIREMENTS

To equip students with the skills they need to succeed in today's workplace, Congress approved the 1994 School-to-Work Opportunities Act to provide states with five-year federal startup funding to develop local and regional school-to-career programs. Each program requires a broad partnership collaboration involving employers, labor representatives, educators, community leaders, parents and government officials.

To date, more than 1,000 local and regional partnerships have received federal funds; additional grants from the $1.3 billion total authorized by Congress will have been awarded before the Act expires in 2001. These developmental grants have encouraged a broad range of innovative approaches to such school-to-career programs as career academies, closer connections to employers and/or community colleges, school-based, youth-run enterprises and community service programs, curriculum reform, and expanded work-based learning experiences.

HIGH ACADEMIC ACHIEVEMENT FOR ALL STUDENTS

Current research shows that school-to-career reform initiatives which emphasize innovative classroom teaching approaches, guided experiential learning outside the classroom, and increased career counseling and guidance have the potential to serve as models for secondary education for **all** students, both those who plan to obtain postsecondary education and those who plan to go directly to work.[1] Pedagogical arguments that support school-to-career approaches apply to many learning experiences. For example, "learner centered" or "authentic" teaching — a pedagogic approach with widespread support among many teachers and parents — is a key aspect of school-to-career

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initiatives. Similarly, guided educational experiences outside the classroom, such as work-based student internships, strengthen and increase the amount of knowledge that is learned, understood and retained. Finally, structured approaches to move young people to think systematically about their aspirations help motivate their interest in academic learning.

Recently, the school-to-career approach has been challenged by some observers who express concern that students are being trained for specific occupations rather than receiving a broad education in the liberal arts. The programs described here focus on skills that can be applied across many different occupations and are designed to increase rather than reduce student options for careers and further education. Vocational training for specific entry-level jobs is a low priority for employers, particularly given their need for employees who can move among a wide range of positions and assignments in the new workplace. For many business and education organizations, school-to-career strategies are an important aspect of education reform. For example, the Committee for Economic Development's 1998 publication, *The Employer's Role in Linking School and Work*, stresses the importance of increased student academic achievement as the most urgent priority for school-to-career programs.[7]

The Coalition of Essential Schools and Jobs for the Future are also developing school-to-career programs to provide students with experiential learning experiences that support high academic standards and develop work-related skills and competencies. In addition, the five-year Benchmark Communities Initiative, developed by Jobs for the Future and funded by the DeWitt Wallace-Reader's Digest Fund, works with four school districts — Boston, MA; Louisville/Jefferson County, KY; Philadelphia, PA; and North Clackamas, OR — to support all students to achieve academically and improve their career prospects. Helping teachers develop their own expertise in designing and assessing projects is also a major focus. This innovative school-to-career initiative emphasizes employer and community engagement, accountability, system building and student outcomes.[8]

In likewise manner, the Southern Regional Education Board (SREB) in its High Schools That Work program supports businesses and communities in 22 states to encourage higher-quality learning by all students. High school students who complete a more demanding academic curriculum and pass a year-end test receive an SREB certificate. Participating companies are exploring ways their employment processes can recognize the SREB certification in terms of hiring practices. For example, BellSouth has agreed to waive the company's general qualifications test for SREB certificate holders, since *97 percent of these applicants* pass the test with higher than average scores.

TECHNOLOGY AND STUDENT ACHIEVEMENT

Computers and other modern technologies can enhance the capacity of schools and training organizations to improve teaching and learning. Students currently use computer-based technologies for many learning purposes: to enhance academic course work, expand career awareness, develop knowledge of computer-based business applications, provide customized tutoring, or simulate technical models. Moreover, the ability to access the Internet, communicate by e-mail, and network via technology contributes to student learning.

School-to-career programs and related approaches that stress active roles for young people are especially compatible with the potential of technological tools. These approaches make use of such real contexts as work or community service to spur learning and practice skills. Further, these approaches contribute to the kind of preparation that is required for today's changed workplace. Technology combined with school-to-career approaches can address the following objectives for young people:

- **Strengthen engagement in learning both academic and work-related skills by providing access through direct experience and simulations to work or work-related activities.**
- **Build essential skills that traditional disciplines may ignore, such as SCANS skills.**
- **Increase knowledge of career postsecondary and life options.**
- **Encourage occasions to work closely with adults and peers.**
- **Provide opportunities to strengthen decision-making skills and to assume active roles in plans that benefit communities.**

The projects and initiatives described in this publication incorporate many of these objectives. Clearly, school-to-career approaches that use new technologies also must be well designed and of adequate intensity and duration to affect student learning. When these considerations are taken into account, all young people can benefit: those who are in school or out; those who plan to go to college after high school; those who choose to work after high school.

FUNDING SCHOOL-TO-CAREER PROGRAMS

Obviously, schools and school districts need adequate resources to fund school-to-career programs. In addition to funding provided by the School-to-Work Opportunities Act of 1994, many federal and state agencies have categorical funds for such activities. Private foundation funds are also available, as well as in-kind services and contributions from local businesses and corporations. The most effective funding for school-to-career activities, however, is achieved when such programs are truly integrated into a district's main academic budget and shape a core strategy for school reform. Once the interest of business leaders, educators and community representatives has been sparked, developing a school-to-career partnership will open opportunities for appropriate funding sources.

Federal Resources for Educational Excellence (FREE)

This Web site is a collaboration of more than 35 federal agencies that makes hundreds of Internet-based education resources easier for students and teachers to access. Users can search by topic; resources can be viewed in 10 subject areas. The site also offers a "Looking for Partners" page to facilitate future partnerships among schools, federal agencies and organizations. *www.ed.gov/free*

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Bringing the World of Work to the Classroom

Technology and Business/School Partnerships

Computer-Based Career Guidance Activities

Distance Learning Technologies

Creating Career Pathways with Computer Technology

When schools and businesses communicate with one another and provide opportunities for one another, it makes learning for youngsters far more relevant to the world outside.

Milton Goldberg
Executive Vice President, National Alliance of Business

provide opportunities to bring the outside world into the classroom via the Internet, e-mail and videoconferencing. Technology can also serve as a catalyst for students to speak directly with employees about their work, as well as learn more about their own career interests and aptitudes. As noted earlier, there is a wide range of successful school-to-career programs that do not include technology in their efforts. The following examples illustrate ways that technology can easily enhance these programs.

TECHNOLOGY AND BUSINESS/SCHOOL PARTNERSHIPS

Many schools and businesses arrange to have business employees visit classrooms and speak with students about work and career opportunities. These occasions can provide hands-on opportunities for students to understand how technology works, as well as demonstrate the relevance of mathematics, science and academic subjects to "real world" careers.

Vermont and Standards-Based Reform

A leader in standards-based education reform, Vermont is one of the first states to align its school-to-career initiatives with the State Department of Education's Framework of Standards. As a major Vermont employer, IBM has developed an Educational Outreach Program using experiential learning activities for K-12 students. To teach young children about the nature of technology, for example, a team of five to six IBM engineers sets up several used computers in a class of 25 children. Teachers divide fourth- to sixth-grade students into teams of five to disassemble a computer down to its basic elements. Students then reassemble it and make sure it still works. IBM staff slow the children down by asking questions and having students reflect on what they are doing. This hands-on learning approach demystifies technology and uses students' communication and problem-solving skills — both important SCANS skills and outcomes for the Vermont Framework.

Vermont's School-to-Work Resource Guide

The Lake Champlain Regional Chamber of Commerce and the Vermont Student Assistance Corporation have developed *The School-to-Work Resource Guide: An Experiential Learning Activity Handbook for Teachers, Employers, Students and Parents.*

This comprehensive guide links specific school-to-work activities to student learning objectives identified in the *Essential Elements of Career Development* and the *Vermont Framework of Standards and Learning Opportunities*. It also clearly identifies 21 age-appropriate activities for students in grades K-14, along with step-by-step instructions, and provides "best practice" guidelines and exemplary models aligned with the Vermont Framework that can be easily implemented. Each activity also includes student learning areas and learning objectives for personal and career preparation, self-knowledge, and knowledge-to-work. *www.Vermont.org/ChamberRoot/educatio*

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Middle School Students and Careers

Pioneering the Future, a technology program developed by BellSouth, is designed to show middle school students that the skills they are acquiring in class have important applications in the world of work. The program is currently a partnership among BellSouth, the National School-to-Work Office, the state school-to-work offices of Florida, Kentucky and North Carolina, the U.S. Department of Education, and the U.S. Department of Labor. In the 1997-98 school year, classes were conducted in 50 middle schools throughout nine southeastern states.

During the first of a series of classroom visits, BellSouth volunteers introduce a specific area of telecommunications and demonstrate the meaningful roles that math, science and language arts play in developing skills necessary to perform in that area. The students connect and test a telephone circuit, learn how individual circuits are connected to a network, and explore fiber optics. They decide what services best meet the different telephone needs of customers; they engage in role-playing as a customer and a service representative. Working in teams, students then develop a plan for providing telecommunications services to an imaginary town — Anytown, USA. They also create a portfolio and make a presentation encouraging people to move to and work in the town. While the program uses the telecommunications industry as the setting for most activities, the students are asked to recognize that this is an example of how skills are applied in one industry and are encouraged to consider how other industries employ these same skills. *www.bellsouthcorp.com/bsf*

COMPUTER-BASED CAREER GUIDANCE ACTIVITIES

Interactive computer-based software programs also provide middle and high school students with opportunities to learn about the world of work in their own classrooms and to see the relevance of academic subjects to different types of careers.

Workplace Simulations

Classroom Inc. — founded on the principle that students are better able to develop and strengthen academic skills when they use them in a "real life" context — develops innovative computer-based simulations of workplace experiences for use in middle and high schools and community-based organizations. Each simulation places students in a decision-making role within a particular organization. In *Classroom Inc.* classrooms, students are organized in teams of three or four around a computer. Working collaboratively, teams gather information, define problems, evaluate solutions and make decisions. Every decision is met with immediate feedback. A semester of the *Classroom Inc.* curriculum may span several years in the life of a business, permitting students to see the long-term results of both good and bad decisions. Current workplace simulations include the fields of banking, health care, hospitality, civics and the environment. To enhance the effectiveness of educators who use computer-based workplace simulations, *Classroom Inc.* also provides professional development opportunities that explore how these innovative curricula can be used in mainstream academic classes. *www.classroominc.org*

Career Guidance Activities

At St. Francis High School in St. Francis, MN, all students in grades 9-12 participate in a "Futures Prep" school-to-career program. Working with a computer-based career guidance software program called DISCOVER, freshmen take a required nine-week course designed to introduce the enormous range of potential careers available to them. Students learn about the World of Work Map and take tests on interest inventory, abilities inventory, and job inventory. Based on their results, students select a career pathway, look at 10 to 15 careers within that pathway, and eventually choose three careers to write about. "At this point, we're not trying to have kids choose a career. We want them to understand what information is critical as they look at careers, and what pieces need to be a part of that process," commented one Futures Prep teacher.

After they finish the course, students develop a personal plan for high school, choose a career pathway, and select an appropriate course schedule. They also receive a Futures Prep portfolio. Throughout high school, students reaffirm their pathway each year, or choose another. One teacher observed that as students progress through high school, they go back to DISCOVER again and again. "They like the way it lets them do self-directed learning." In grades 10, 11 and 12, students visit local universities, community colleges, and technical programs as well as participate in job shadowing and internship opportunities at local businesses. Seniors also receive help on writing resumes, conducting mock interviews, and obtaining letters of reference. [1] *www.act.org/discover/*

The whole point of Futures Prep is to expose kids to a variety of potential careers. We help young people look inside to see who they are; outside to see what's available; and ahead to the world beyond high school.

Teacher, St. Francis High School
St. Francis, MN

DISTANCE LEARNING TECHNOLOGIES

Distance learning technologies make it possible for students to have a "worldwide classroom" to learn about careers and interact with employees located in different work settings. In addition, as school-to-career programs start addressing the issue of moving to scale, that is, modifying programs to fit larger and larger entities, the networking capabilities of e-mail and the Internet open up the possibility of having more people meaningfully involved in school-to-career activities.

Videoconferencing

Through videoconferencing, students can "visit" hard-to-access work sites ranging from the Jason Project (an underwater bathyscaphe) to a coal mine, observing and interacting with workers in a variety of jobs. Other distance learning projects (such as Connecting the Past to the Future, at Western Illinois University) provide students with videos of people at work in different jobs as well as opportunities to interact with those people via satellite hookups. In other projects (such as the Mars-Based Project), using audio-, video- and text-based data exchanges — including a videoconference with NASA — students learn about space and space technology, and they build model space stations.

Distance Learning in the Theatre

In partnership with the Manhattan Theatre Club, IBM and the Bell Atlantic Foundation helped launch *TheatreLink*. This innovative curriculum-based Web project uses the Internet and distance learning technology to bring theatre to students in remote geographic or economic areas where arts education and professional theatre are not available. To date, four schools in West Virginia, Vermont, Kentucky and New York have been linked, and six more are scheduled to be added in 1999. Classes at each site write an original scene based on a Manhattan Theatre Club play; the scene is then mounted and videotaped by students at a partner school. Using the *TheatreLink* Web site, students confer with MTC teaching artists, study the MTC play, and communicate with their partner schools. Local teachers make connections among the project, the existing school curriculum, and relevant educational standards. "*TheatreLink* has enabled Manhattan Theatre Club to involve geographically isolated students in a unique and powerful theatrical collaboration, helping students learn about theatre, about themselves, and about communities with which they would otherwise have had no contact," says David Shookhoff, education director at Manhattan Theatre Club.

E-Mail Mentoring

Online computer technology such as e-mail and the Internet can help students enhance academic learning and develop SCANS workplace competencies by using technology-based communication skills. For example, Connections for Learning (CFL) links teachers and students with business mentors throughout Massachusetts to develop classroom projects that have direct workplace applications. Managed by the Boston-based Corporation for Business, Work and Learning, CFL is funded by the Telecommunications and Information Infrastructure Assistance Program of the U.S. Department of Commerce. Currently, 180 teachers, 4,000 students, and 400 online business "telementors" are participating. Five of the six participating school districts are part of Communities and Schools for Career Success (CS²), CBWL's comprehensive school-to-career demonstration project.

As part of IBM's Reinventing Education program, schools in Detroit, MI, and Charlotte-Mecklenburg and Durham, NC, are using the Wired for Learning technology that combines the power of the Internet and the security of Lotus® Notes® to enable greater parent and community involvement in the learning process. Teachers can identify university professors, museum historians, and other concerned citizens from a database of registered and approved mentors to serve as resources for specific instructional units or as online tutors. These mentors are able to work from their home, work, or other networked locations at their convenience, thus eliminating time and distance constraints that often act as barriers to volunteerism.

IBM employees in Vermont are able to "flex" their work schedules in order to tutor students. For remedial tutoring, one-on-one tutoring is ideal; for enrichment, however, e-mail has possibilities. Marian Lawlor, IBM Manager for Educational Outreach in Vermont, explains: "If an employee has to personally visit a student each time, tutoring can be very time-consuming. Vermont is a rural state and, as a major employer, we have lots of needs throughout the state. E-mail mentoring provides a real opportunity to help minimize the impact of time spent driving. This is a systemic problem with the potential for a technology partnership solution."

CREATING CAREER PATHWAYS WITH COMPUTER TECHNOLOGY

Throughout the United States, school-to-career partnerships are developing computer technology career pathways that combine an academic high school curriculum with technical training and an entrepreneurial experience. For example:

- IBM has worked closely with the Capital Area Training Foundation and other high-tech companies in Austin, TX, to develop Tech Prep articulation agreements that provide college credits in escrow for industry-certified computer courses, which high school students can apply to the postsecondary institution of their choice.
- Three high schools and two community colleges in Massachusetts are working with the Corporation for Business, Work and Learning to develop networking and computer concepts courses in the mathematics and science curricula as a foundation for a computer technology career pathway. Students will network and maintain computers for local schools.
- ExplorNet in Raleigh, NC, has developed ComPuteRecycling, an entrepreneurial community service project in which local businesses donate used computers for students to upgrade for use in school classrooms.

www.explornet.org

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Technology and Active Learning Experiences

Entrepreneurial Student-Run Business

Simulated Business Environment

Multimedia Student Internship

On-Site Apprenticeship

Technology and Community Service Projects

This has changed my life. I came to this course as my father's electronics apprentice. Now, I can't wait to go to college. I'm going to be a business major!

Student, Virtual Enterprises Program
Martin Luther King Jr. High School
New York City

apprenticeships, as well as a wide range of community service projects. School, business and community partnerships are increasingly using computer-based and other technologies to give students exposure to career pathways in many fields.

ENTREPRENEURIAL STUDENT-RUN BUSINESS

MACTECH, a full-service office store based on the "Office Max/Kinko's" concept, is located in Detroit's David Mackenzie High School and is operated by its students. Growing out of The Detroit Compact Program, a consortium of businesses and corporations working with middle and high schools, this student-run business is part of the high school's Business Services and Technology Department and the Tech Prep Partnership 2000 Consortium's curriculum development initiative.

Two-Year Curriculum

Students have an opportunity to work in an entrepreneurial business setting and be trained in the "office store" concept while attending school. The two-year Office Technology and Production curriculum offers classes in two-hour blocks, designed to provide practical work experience in office and computer skills, communication arts, accounting, sales, product services and advertising. As of September 1998, 75 students are participating in this program.

MACTECH serves students and staff, the local school community, individuals, businesses, organizations and youth clubs in the Detroit metropolitan area. Services include business cards, graphics, resumes, reproduction, lamination, binding, address labels, flyers, word processing, enlargement, bulletins and more. Students are trained in taking information from a customer, filling out and completing work orders, laying out business cards, and more. Currently, MACTECH fills 20 to 30 customer orders weekly — both large and small jobs. The students run the store as a business, and the revenue they generate helps the school purchase equipment. Since the students work as part of the curriculum, they are not paid.

Computer and Software Training

Because of the similarity of the MACTECH curriculum training to the products and services available in the IBM Business Support Center in Southfield, MI, students are trained on computers and software at the Center. As part of their training, students also time-stamp their work and record the specific times they enter and leave the Center. This gives students an understanding of what it is like to be in a real work environment and be evaluated as if they were working at a regular job. IBM personnel provide additional quality work site experiences for students — such as job shadowing and field trips — as well as the office furniture, equipment and supplies that make the setting and environment conducive to business and industry standards.

The hands-on training and skills students receive have the potential of providing a program of study that will increase motivation and achievement; develop students' interests, abilities, and acquisition of knowledge and skills; and provide them with office skills that will prepare them for employment opportunities at IBM or other similar businesses. Their growth will encourage them to seek higher education. School staff noted that this is the first such school-to-career program in Detroit to be housed in a general rather than a vocational high school. This school-to-career curriculum is also designed to prepare students for careers in desktop publishing and the graphic arts field, as well as the fast-growing field of document generation and processing and of office technology.

This experience has taught me how to be a professional at work. I've learned how to be part of a team, how to handle customers, as well as how to use computers and software to create a business product.

You have to be responsible for everything that happens in your business. Even if your equipment breaks down, you still have to deliver the order.

MACTECH student entrepreneurs

SIMULATED BUSINESS ENVIRONMENT

Many New York City high school students are given an opportunity to work as an entrepreneur in an international company. Through the Virtual Enterprises International Program, students experience, in a simulated business environment, all facets of being an employee in a firm. The program provides high school juniors and seniors with interdisciplinary instruction and an in-school work experience to develop school-to-career skills. Iris Blanc, Director of the Virtual Enterprises Program in New York City, notes:

> *The success of this "business" program is ultimately measured by our students' growth. This program is helping youngsters evolve and interact with each other in a responsible manner. It's teaching team-building and problem-solving techniques. And when I see a youngster, who prior to this program had no self-esteem or direction, give a presentation to a gathering at the Federal Reserve Bank — that's success.*

Currently, more than 2,000 virtual enterprises in 20 countries are part of the International Practice Enterprise Network. In September 1996, a virtual enterprise was established in seven New York City high schools. As of September 1998, the Virtual Enterprise Network in New York City had nearly 40 member firms.

Operating an International Firm

Each school establishes a business in which, for two periods daily, students use computers to do everything from creating sales and marketing campaigns to setting up employee policies. Using state-of-the-art technology, including the Internet, virtual enterprises transact business with each other as well as with practice firms in Europe, Canada and Australia. Only two things about the experience are not real: there are no monetary transactions, and no product is delivered.

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This class differs from a typical class because there is no one telling you what to do. You are responsible for the success of your company.

I can't say that I didn't like school before, but there's a link now — I'm ready to learn.

Virtual Enterprises students

The main objectives of the program are to improve students' skills in developing problem-solving strategies on their own or as a team, as well as in communicating and cooperating with supervisors and other employees in the firm. In addition, students participate in the international network of practice firms, acquire global economic knowledge, and use technology as applied to business, including the use of the Internet for global transactions and communications. Among the virtual enterprises in the New York City network are catering, travel agency, art gallery, video and book club, toy distributor, trade publication, printer, office products/supplier, sportswear, ticket broker, financial services company and advertising agency.

Teachers as Facilitators

Each virtual business has a corporate partner as a mentor. Teachers have the role of facilitators for student learning. One teacher commented: "First, I explain, demonstrate, and provide handouts and then I say, 'Go do.' Students need to bring their own initiative, reliability, creativity, leadership and problem-solving skills to the business." *www.nycps.k12.ny.us/~ve*

MULTIMEDIA STUDENT INTERNSHIP

Since 1992, more than 250 California high school students have participated in a wide range of school-to-career internships through the Autodesk Foundation's Student Internship Program, developed in cooperation with local schools, businesses, industry and community-based organizations, and the Marin County Office of Education. Participating interns work with employee mentors in different areas of Autodesk Inc. to learn all aspects of implementing projects. Students also learn essential workplace skills, such as interviewing, synthesizing information from diverse sources, and reporting outcomes through oral, written and multimedia presentations. "In this incredibly fast-growing industry, there's a real lack of qualified talent. Young interns help solve a real need," a creative director observes.

Foundation staff work closely with county and district superintendents, principals, teachers, parents and business leaders to map out areas in which student course work is the content basis for the internship, and basic workplace competencies are infused within the course content. "It takes time to train interns to do technical jobs," notes one manager. "But not having highly paid engineers distracted in tasks students can do, results in significant cost savings." Students also share responsibility for the development of the intern program itself. The program supports students in developing postsecondary plans as well.

People here respect your skills, regardless of your age. It helped me to learn to handle problems on my own, to find out who to see to get what I needed, and to use common sense.

Autodesk Student Intern

Intern projects have included developing animations for the San Rafael Theater renovation, creating a virtual fair for the 1995-96 Marin County Fair, and illustrating The Mustang Project, a high-tech mechanical design/multimedia software project. In another program, interns have worked with the company's Marketing Support Team Integrated Media Lab to produce electronic sales tools for the company's corporate communications. Another project, Design Your Future: Mathematics, Science and Technology for Girls, provides opportunities for young women to explore mathematics, science and technology-based careers. www.autodesk.com/foundation/stc and www.autodesk.com/compinfo.tgf

ON-SITE APPRENTICESHIP

As part of a proactive effort to expand the pool of potential employees with building maintenance/operations experience, several Vermont employers (including IBM), two high schools, and another education organization developed a student apprenticeship curriculum approved by the Vermont Department of Education. On completing the two-year apprenticeship, a student receives a Department of Education Certificate in Building Maintenance.

A high school student from Essex Technical Center and one from Burlington Technical Center recently completed apprenticeships at IBM's Burlington manufacturing site. Both students received firsthand experience in all aspects of building maintenance and operations, from electrical and mechanical systems to safety requirements and structural specifications. When not on site, the students attended their regular academic classes, which included practical chemistry and blueprint reading.

One of the most valuable things I've learned is the practicality of science and math in real work — for example, knowing the velocity of air in a certain size duct or the gallons per minute of water in pipes.

Student Apprentice

One of the apprentices commented on the importance of computers at the facility. "You wouldn't think you'd need to know computers for this job, but it's a must," he observed. "Computers provide the infrastructure for the entire facility and run all the equipment. You need to set the equipment for 68F degrees temperature and 38F degrees dew point, and every piece of equipment is different." The student also noted that he had learned a great deal about teamwork as well. "The group of guys I work with are just great. Everybody knows about what each other is doing and can help out. I've learned that you need a team to build something."

An IBM staff person involved in developing the apprentice curriculum noted that for this type of apprenticeship to succeed, students need to know that many types of businesses would want the skills that they develop as apprentices. "The curriculum is transferable to any business — every business has the same needs. Currently, General Dynamics, Husky Injection Molding, Ben and Jerry's, and the University of Vermont are also considering the curriculum." Summing up, one of the apprentices observed, "The most valuable part of this experience has been the exposure to everything. This apprenticeship gives you lots of options. You'll get your future because you can easily transfer to a specialization, if you choose."

TECHNOLOGY AND COMMUNITY SERVICE PROJECTS

Many school-to-career activities provide experiential learning through community service projects that also develop job skills and exposure to career pathways. Examples of such programs taking place in schools around the country include:

Students as media developers. Students in internships produce and broadcast radio programs, as in the Berkeley (CA) out-of-school Youth Radio, or spend the summer producing science and technology-based videos with the Girl Scouts' Teen Treck (Toledo, OH). In school-based programs, students produce the school's newspaper and TV news, as well as public service videos for the community in programs like the Watsonville (CA) Video Academy and the Freemont High School Media Academy (Oakland, CA).

Students as Web site developers. In a number of schools, including schools in Oakland (CA), Union City (NJ) and Pontiac (MI), students create Web sites for small businesses and community-based organizations. Students at Adams High School (Rochester Hills, MI), create Web sites for area businesses and run a small advertising agency. "Webmaster School" as a semester-long art elective.

Students as designers. Students use computer-aided design (CAD) and other technologies to assist them in design areas. At Blackstock Junior High School (Port Hueneme, CA) students go to Tech Lab 2000 to use CAD to design products they then fabricate using a computer-controlled flexible manufacturing system. Tech Lab 2000 is supplemented with technology-based classrooms in science, literature and history, business education, and English as a Second Language.

provide on-site learning experiences for teachers to learn more about current workforce trends, employee job requirements, and the relevance of academic subjects to different types of work. The length of time teachers may spend on site can vary considerably, ranging from a single day of job shadowing to a six- to eight-week summer internship or even a yearlong fellowship. For professional development initiatives to produce results in the classroom, careful planning and attention to the "before," "during" and "after" phases of such efforts are critical. Programs also need to include technology training for teachers, so that teachers and students will know how to use technology as it is used in the workplace — as a tool for communication and doing work.

JOB SHADOWING, INTERNSHIPS AND FELLOWSHIPS

Job shadowing is a popular format for teachers to visit companies to learn about specific business environments and different types of jobs. For example, at its manufacturing site in Research Triangle Park, NC, IBM hosts an "Industry Awareness Week" to strengthen communication and awareness between educators and business people. Teachers, administrators and counselors from surrounding counties spend a full week at IBM, where they discuss hiring activities, employment practices and requirements, corporate culture, environmental and diversity issues, as well as career paths and development with IBM employees. Educators also shadow employees to learn about software development, networking, personal computers, real estate, education and human resources.

Business Work Environment

At other IBM manufacturing sites, teachers frequently shadow employees in the morning, and during lunch discuss what they learned from operators, technicians, engineers and managers. Teachers not only pick up substantive information about different jobs but learn *how* employees work together, as well. One teacher commented, "Every time my guide spoke, she used the word 'we'." An employee responded, "In our business, we are always building 'team' as a way of getting things done together."

Impact on Curriculum

Many companies also welcome teachers as interns or employees at their workplaces during the summer. In partnership with local school districts and other area businesses, IBM has developed such programs at plant locations in Tucson, AZ; San Jose, CA; and Burlington, VT, among others. For example, Industry Initiatives for Science and Math Education (IISME), a nonprofit organization that IBM helped found in San Jose, CA, creates eight-week summer workplace fellowships for K-12 teachers so they can use what they learn from their industry experience to enhance their curricula. Each prepares an Education Transfer Plan that specifically outlines what the teacher is committing to do in the classroom; each is guided in this process by peer coaches who are former IISME Fellows. To date, nearly 100 teachers have been employed by IBM as summer fellows.

As part of the Vermont Employer/Teacher Internship Program, high school math and science teachers are employed during the summer to give them a better understanding of the work world; they relate that understanding to how different subjects are taught. For example, at the B.F. Goodrich Aerospace Company, one high school teacher worked on the software design for the fuel management system of the F-22 airplane, learning how engineers write, test and organize software.

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Professional Development for Teachers

Job Shadowing, Internships and Fellowships

Pioneering Teacher Technology Standards and Training

Professional Development Guidelines

There have been a number of opportunities for us to come together to learn about technology. That kind of dialogue — to sit down and share with other teachers — has been as valuable as the computers.

Dorothy Kennedy
Library Media Resource Teacher
Olinder Elementary School
San Jose, CA

As a result of his experience, he integrated programming logic into his classroom lessons. "However," he reflected, "the most valuable thoughts I share with my students are less about software testing than they are about problem solving and fitting into a job in general."

Another math teacher worked at IBM in the manufacturing engineering area, taking measurements as a product moved through the line. After seeing a "real world" application of a subject like statistics, the high school teacher changed his method of teaching statistics. By having even one teacher experience the work world, a teacher's curriculum can be enriched when he or she returns to the classroom and, potentially, hundreds of students can benefit.

"Break-the-Mold" Collaborations

Transforming Teaching and Learning: Educators in the Workplace, a BellSouth Foundation initiative, serves as a catalyst for "break-the-mold" school-business collaborations in which teams and groups of teachers spearhead curriculum and school change. One such project is in Catawba County, NC. In response to the area's growth in fiber optics and other high-tech industries, a unique yearlong sabbatical paired two Newton high school teachers with Siecor, CommScope and Alcatel NA to develop expertise on workforce needs and create two new high school courses that use technology as an educational tool. *www.bellsouthcorp.com/bsf*

PIONEERING TEACHER TECHNOLOGY STANDARDS AND TRAINING

Through a Reinventing Education grant, the San Jose Unified School District is working with IBM to pioneer new models of professional development that will allow San Jose to change its requirements for pre-service teacher training and teacher licensing. These changes will enable teachers to demonstrate expertise in classroom uses of technology for all subject areas, as now required by California state law.

The district first developed a new set of teacher technology standards that articulate the skills teachers need. To help teachers reach the standards, the grant is developing an electronic tool that provides guidance and instruction on skill-building activities. The tool also enables teachers to collect evidence from the activities, resulting in their developing a portfolio that documents their teaching practice.

This innovative technology is being combined with two new models of teacher professional development. One is a summer clinical program in which teams of teachers work with specially skilled classroom teachers, engaging in hands-on, classroom-based learning to build upon their teaching skills, with an emphasis on technology use. Ongoing support and collaboration help ensure that teachers effectively implement newly acquired skills in their own classrooms.

The only way to get a return on your investment in technology is by investing in professional development for teachers.

Robin Willner, Director of Corporate Social Policy and Programs, IBM Corporate Community Relations

In the second model, San Jose teachers identified 29 projects in which technology would significantly improve learning. "As we wrote our projects, we designed a planning form that set down actual activities that would take place to implement the goals, and then assessments, so we would know when we got there," noted one school teacher. At the end of the project, teachers will assess how technology improved learning for the students while moving the teachers along the technology standards.

PROFESSIONAL DEVELOPMENT GUIDELINES

The President's Committee of Advisors on Science and Technology/Panel on Educational Technology recommends that 30 percent of an educational technology budget be devoted to professional development. On average, school districts currently spend less than 15 percent of their technology budgets on teacher training, with most of the rest going to hardware and software. When staff development does occur, the primary focus is usually on how to operate the equipment, rather than on how to integrate technology into the curriculum.[1]

Teachers vary greatly in terms of their own familiarity and comfort level with technology. Some have not used computers at all, either personally or professionally. Some may use computers for word processing or some other function. Others may be very proficient and comfortable with technology. School administrators who encourage teachers to develop their own skills create an environment that supports the potential of technology to enhance teaching and learning. Actions to keep in mind when planning professional development for teachers include:

- **Provide an instructional focus that illustrates how technology can support specific educational objectives.** Since computer technology is a *tool* to facilitate student learning, educators need to first determine what curriculum is appropriate for their students and then select software that will enhance what is being taught. Also, classrooms vary considerably and software must be compatible with each school's computer hardware and technological infrastructure. Otherwise, even the most user-friendly technological resources become merely "bells and whistles" appendages.

- **Allow sufficient time for teachers to learn to use computers effectively.** Teachers need time to learn to use specific hardware and software, to experiment hands-on, and to take risks until they are comfortable using the equipment.

- **Encourage collegial interaction and coaching while teachers are learning to integrate technology with curriculum.** To learn how to incorporate educational software and networking into specific lesson plans, teachers need to see the actual process of students using technology in real classrooms and to ask questions of colleagues. Teachers also need to have access to classroom computers when students are not in class, for their own learning and for lesson planning.

- **Use computer technology to support ongoing professional development.** Once teachers begin to use technology in their classrooms, ongoing communication with other teachers and support staff is critical to a teacher's ability to implement and sustain new teaching practices grounded in technology. E-mail, listservs, "best practices" Web sites, chat rooms, as well as the Internet, can help provide this support.

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Systemic School-to-Career Initiatives

Northern California:
Linking a Regional Economy

Boston:
Creating a School-to-Career "Intranet"

Southwest Tennessee:
Developing High-Performance
Workplace Competencies

Los Angeles:
Moving to Scale in a Large Urban Area

By actively engaging their local education systems, establishments may be helping to generate a future labor force that is more stable, more work-ready, and presumably better matched to the workplace of the future.

1998 National Study on Corporate Participation in Schools
Institute for Research on Higher Education
University of Pennsylvania

of communities today are developing districtwide or regional school-to-career initiatives and grappling with the issue of moving to scale in order to provide school-to-career strategies for all students. As the following vignettes illustrate, systemic technology applications can serve a variety of customized networking, communication, and interactive training functions. Software programs have been developed for such purposes as:

- **Linking job and internship opportunities for students and employers.**
- **Facilitating project planning through Web sites and chat rooms.**
- **Disseminating information on "best practices" for school-to-career programs.**
- **Providing individualized skills assessment and training modules.**

Systemic technology applications also have the potential to create greater parent and home involvement in school-to-career activities through e-mail, Web sites and the Internet.

NORTHERN CALIFORNIA: LINKING A REGIONAL ECONOMY

BaySCAN

In Northern California, the Bay Area School-to-Career Action Network (BaySCAN) — consisting of 12 counties containing 8 million people — connects local school-to-career partnerships, posts job openings, and provides online information about school-to-career activities across the region. BaySCAN supports school-to-career as an educational opportunity for all people and supports school reform efforts incorporating principles developed by the Bay Area School Reform Collaborative School-to-Career Task Force. *www.bayscan.org*

When local communities can be connected to a regional system, the economy of the entire region can benefit from innovations occurring in diverse local areas. For example, schools in the North Coast Rural Challenge Network can access a listserv of student internships and job postings in urban settings. PathFinder — an interactive online data management, placement and coordination system used by several of the region's county-based school-to-career partnerships — provides individualized access for students, schools, employers and community participants to a Work-Based Learning Opportunities Database that can match school profiles, student profiles and employer profiles. The system also creates an ongoing database for project evaluation. The PathFinder system is used by more than 200 school districts across the country. *www.visionlink.org*

Workforce Silicon Valley

Workforce Silicon Valley, the school-to-career partnership that serves Santa Clara County, has established the BayScholars Program with six learning collaboratives located in different high schools. Each collaborative focuses on a specific industry discipline in high-wage, high-employment fields, such as advanced manufacturing, apparel technology, financial services, health/bioscience, information technologies and multimedia. Through Workforce Silicon Valley, industry-specific job skill requirements, high school curricula, student internships, teacher fellowships, and community college courses are all aligned to provide Bay Scholars with an articulated system of learning and skills development. *www.wsv.org*

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Skillsnet

Northern California's rapidly growing digital arts industry has also prepared a comprehensive, interactive Web site called Skillsnet to help people train for and enter careers in multimedia, animation, or digital visual effects. The Web site contains an industry guide, an occupation guide, a training guide, a jobseekers guide, a resource center, as well as current industry news. For example, through the Training Guide, one can learn about opportunities for acquiring skills needed to participate in the multimedia, animation and visual effects industries. Its skills provider database currently lists 177 programs ranging from degree, professional and certificate programs to weekend seminars. The Jobseekers Guide provides tips for preparing a resume and a portfolio; tips for marketing oneself; Web site addresses and mailing lists; and a guide to internships and apprenticeships. *www.skillsnet.net*

BOSTON: CREATING A SCHOOL-TO-CAREER "INTRANET"

Network for Student Success, a joint venture of the Office of Instructional Technology, Information Systems and the School-to-Career Office at the Boston Public Schools, has implemented a project-based learning strategy in six high schools. The Network unites high schools, school-to-career work sites, and community-based organizations (CBO) to align school and work experiences with Boston's rigorous standards. Online technology plays a primary role, joining schools, community centers and workplaces. Funding came through a $650,000 matching grant from the U.S. Department of Commerce's Telecommunications and Information Infrastructure Assistance Program (TIIAP).

Community Service Projects

Participating high schools and CBOs received a "networked lab" with 10 computer workstations. Each high school paired up with a CBO and a local business to form seven TIIAP teams to develop curriculum projects that integrate technology and school-to-career competencies. The TIIAP teams developed seven community-centered projects that entailed teaching senior citizens how to use computers; creating a multicultural garden and cookbook; designing a new school cafeteria; learning about fiber optics and Web site design; researching welfare reform and executing a job training fair; documenting a landfill-to-park conversion project; and creating a Web site for local job opportunities.

Intranet

A "TIIAP Intranet" was also developed to enable teachers, students and business partners to share and exchange information about their team projects. To facilitate communication, each of the seven TIIAP teams had its own workspace on the TIIAP Intranet, along with a joint community workspace where projects could be shared. Project coordinator Felicia Robb notes, "The Intranet greatly enhanced communication among students, teachers and community partners. For example, 500 students on one TIIAP team were researching and planting a multicultural garden. Students would communicate with students in other classrooms via the Intranet about the results of soil testing, plant selection, and so forth. In addition, teachers' intranet messages also were sent to their regular e-mail address so they only had to check one message center." During the next phase of the project, funded by Bell Atlantic, schools will strengthen their electronic connection with participating businesses by developing school-to-career technology units that will be shared on the school district's curriculum Web site. *www.dev.Boston.k12.ma.us*

SOUTHWEST TENNESSEE: DEVELOPING HIGH-PERFORMANCE WORKPLACE COMPETENCIES

Smith and Nephew, a manufacturer of orthopedic devices located in Memphis, TN, recently analyzed the competencies its workforce would need to stay "out in front of the change curve" as a high-performance workplace, according to Dwain Beydler, group manager for organizational development. As a result, over a period of several years, the company has redesigned its manufacturing jobs away from traditionally defined job tasks, and created "roles" that span the beginning and concluding points in the manufacturing process. Twenty different jobs have been consolidated into four distinct roles, which employees are being trained to fill. Training modules vary. Some are instructor-led classes supplemented with computer course work. Other modules contain interactive educational software to expand employee skills and technical competencies.

As part of the Southwest Tennessee School-to-Career Partnership, the company works closely with local high schools and community colleges to create a systemic articulation of school-to-career strategies that will help students develop "high-performance" workplace competencies. For example, an interdisciplinary team of high school teachers work with the company and community college faculty to prepare a new manufacturing-related curriculum within the umbrella of school reform and school restructuring. During a six-week summer internship program, teachers rotate through many areas of a plant. Afterward, they review national standards, workplace skills standards, job tasks analysis, and workers' skills as part of curriculum development and implementation. Teachers share their knowledge with colleagues through an online database. The partnership is also working to create an open architecture of information accessible to parents, to help keep them engaged in their children's education.

LOS ANGELES: MOVING TO SCALE IN A LARGE URBAN AREA

UNITE LA, a systemic initiative in Los Angeles, has been developing a comprehensive five-year plan to unify a wide range of separate school-to-work programs in high schools, community colleges, alternative high schools, juvenile programs, and universities. Accomplishing this requires the partnership of many business, education, government, union and community constituents. David Rattray, UNITE LA executive manager, notes that "scale is key" in developing a school-to-career system that can effectively reach across a large population. "To make this happen, developing leveraging strategies is essential. School reform requires innovative thinking, and empowering school leaders. We have to access the system at all levels to open up its potential for reform."

Year 2002

To help ensure that technologically-rich school-to-career programs are available to all students, UNITE LA is committed to making hardware and software as easily accessible to a student attending a suburban school as to one attending an inner city school or alternative program. By the year 2002, UNITE LA hopes to expand the number of Exploring Technology Labs in schools from 25 to 60 so that every student in the K-12 system can be exposed to technology through the labs. UNITE LA is also involved with the teachers' union, so teachers are full partners in developing and owning the project. The university system is redesigning its teacher certification requirements and will include SCANS skills as well as computer technology literacy as part of teacher pre-service education. UNITE LA plans to design its own Web page, as well as provide access points for stakeholders to disseminate best practices and keep current on what's happening in the county. IBM has agreed to serve as an information consultant to build a school-to-career data warehouse and technology platform.

Toddlers to Seniors

UNITE LA supports programs using technology for many diverse student populations. For example, East Side Learning Center — a "technology rich" school-to-career program site — serves a broad spectrum of adult learners, ranging in age from 15 to 90 years. For example, immigrants from Mexico and Guatemala with no computer experience come to learn English as a second language and to work with educational software in a technology lab setting. The center also serves local community hospital employees and provides computer training in applying business skills to a hospital environment. In addition, the Center is a technology training site for the county's 60,000 teachers, as part of the Los Angeles County Office of Education's Technology-for-Learning — a public-private collaborative. Training teachers, school administrators, and technology-savvy parent advocates in each school entails a "trainer of trainers" model, so that participants can train others. Finally, the Center's on-site children's center uses computers as part of its family literacy program.

Our primary focus is to serve as a tool for contextual learning to make learning richer. We plan to support current initiatives and help leverage them — to take things we are doing right and spread them across a whole system.

David Rattray
Executive Manager, UNITE LA

CONCLUSION

Local and regional school-to-career partnerships — with their commitment to link work and learning — are developing a wide range of strategies to provide students with (1) high academic achievement; (2) active work-based learning experiences; (3) relevant skills and competencies for high-performance workplaces; and (4) appropriate career guidance and exploration. As these initiatives mature over the next few years, computer-based technologies will be able to increasingly support them on both a classroom and a systemic level.

Developing the technology infrastructure, along with providing professional development for teachers to learn to integrate technology into their curricula, is also essential to any school's or district's capacity to effectively implement such activities. Once this groundwork is in place, the partnership of school-to-career programs and technology can significantly contribute to every student's success in school and at work. It is mainly through this collaborative effort that businesses and schools will be able to ensure that a highly skilled workforce will meet the demands of a global economy in the 21st century.

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ENDNOTES

[1] Thomas Bailey and Donna Merritt, *School-to-Work for the College Bound* (New York: Institute on Education and the Economy, Teacher's College, Columbia University, and Berkeley: National Center for Research in Vocational Education, University of California at Berkeley, 1997), pp. ii-iii.

[2] Committee for Economic Development, *The Employer's Role in Linking School and Work* (New York: Committee for Economic Development, 1998), p. 10.

[3] Adria Steinberg and Kathleen Cushman, *Rigor and Relevance: Essential Ideas About Connecting School and Work* (Boston: Jobs for the Future, 1997), pp. 7, 29-30.

[4] *Activity* (Iowa City: ACT Inc., Vol. 36/No. 3, Spring 1998), pp. 1-2.

[5] Patricia B. Campbell, Karin Steinbrueck, Kathryn Acerbo-Bachmann, *School-to-Work and Technology: Challenges in a Changing World* (Groton, MA: Campbell-Kibler Associates Inc., 1997), pp. 6-7.

[6] *The School-to-Work Resource Guide: An Experiential Learning Activity Handbook for Teachers, Employers, Students, and Parents* (Burlington, VT: The Lake Champlain Regional Chamber of Commerce and the Vermont Student Assistance Corporation, 1998), pp. 105-110.

[7] *Report to the President on the Use of Technology to Strengthen K-12 Education in the United States* (Washington, DC: President's Committee of Advisors on Science and Technology, Panel on Educational Technology, 1997), p. 8.

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Shown below are addresses, telephone numbers and Web site addresses for many of the programs and organizations mentioned in this publication. This list is not intended to be comprehensive, nor is it representative of the thousands of school-to-career partnerships that have been developed throughout the United States. It contains not-for-profit organizations, government agencies, private foundations, high-tech consulting firms, school-to-career partnerships, and academic organizations that have played a role in creating innovative school-to-career programs, including those that use technology as a tool for student learning.

Achieve, Inc.
1280 Massachusetts Avenue, Suite 410
Cambridge, MA 02138
617-496-6300
www.achieve.org

ACT, Inc.
2201 North Dodge Street
PO Box 168
Iowa City, IA 52243-0168
319-337-1000
www.act.org/discover

Autodesk Foundation
111 McInnis Parkway
San Rafael, CA 94903
415-507-6336
www.autodesk.com/foundation

BaySCAN
c/o Autodesk Foundation
111 McInnis Parkway
San Rafael, CA 94903
415-507-6841
www.bayscan.org

BellSouth Foundation
1155 Peachtree Street, Room 7G-06
Atlanta, GA 30309-3610
404-249-3120
www.bellsouthcorp.com/bsf

Boston Public Schools
Office of Instructional Technology
Office of School-to-Career
55 New Dudley Street, Building #1
Boston, MA 02120
617-635-8880
www.dev.Boston.k12.ma.us

Campbell-Kibler Associates, Inc.
80 Lakeside Drive
Groton, MA 01450
978-448-5402
www.campbell-kibler.com

Capital Area Training Foundation
5930 Middle Fiskville Road
Austin, TX 78752
512-323-6773

Classroom Inc.
245 Fifth Avenue, Suite 1901
New York, NY 10016
212-545-8400
www.classroominc.org

Coalition of Essential Schools National Office
1814 Franklin Street, Suite 700
Oakland, CA 94612
510-433-1451
www.essentialschools.org

Committee for Economic Development
477 Madison Avenue
New York, NY 10022
212-688-2063
2000 L Street, NW, Suite 700
Washington, DC 20036
202-296-5860
www.ced.org

Corporation for Business, Work and Learning
Schrafft Center
529 Main Street, Suite 110
Boston, MA 02129
617-727-8158

DeWitt Wallace-Reader's Digest Fund
2 Park Avenue, 23rd Floor
New York, NY 10016
212-251-9710
www.wallacefunds.org

ExplorNet and ComPuteRecycling
4909 Windy Hill Drive
Raleigh, NC 27609
919-878-0540 or toll-free 888-507-3800
www.explornet.org

Federal Resources for Educational Excellence (FREE)
U.S. Department of Education
Office of the Deputy Secretary
400 Maryland Avenue, SW
Washington, DC 20202
202-401-3000
www.ed.gov/free

IBM Corporate Community Relations
New Orchard Road
Armonk, NY 10504
914-499-5619
www.ibm.com/ibm/ibmgives

Institute for Education and the Economy
Teachers College, Columbia University
525 West 120 Street, Box 174
New York, NY 10027
212-678-3091

Jobs for the Future
88 Broad Street, 8th Floor
Boston, MA 02110
617-728-4446

Lake Champlain Regional School-to-Work Collaborative
Lake Champlain Regional Chamber of Commerce
60 Main Street
Burlington, VT 05401
802-863-3489 ext. 205
www.Vermont.org/ChamberRoot/educatio

MACTECH
c/o David Mackenzie High School
9275 Wyoming Street
Detroit, MI 48204
313-873-9627

Manhattan Theatre Club
311 West 43 Street, 8th Floor
New York, NY 10036
212-399-3000

National Alliance of Business
1201 New York Avenue, NW
Washington, DC 20005
202-289-2888
www.nab.com

National School-to-Work Office
400 Virginia Avenue, SW, Suite 210
Washington, DC 20024
202-401-6222
800-251-7236
www.stw.ed.gov

Skillsnet
c/o Bay Area Multimedia Partnership
2201 Broadway, Suite 303
Oakland, CA 94612
510-628-8330
www.skillsnet.net

Southern Regional Education Board
592 Tenth Street, NW
Atlanta, GA 30318-5790
404-875-9211
www.sreb.org

Southwest Tennessee Partnership
Memphis Area Chamber of Commerce
22 North Front Street, Suite 200
Memphis, TN 38103
901-543-3522

UNITE LA
Los Angeles Chamber of Commerce
350 South Bixel Street
Los Angeles, CA 90017
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U.S. Department of Commerce
Telecommunications and Information Infrastructure Assistance Program (TIIAP)
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Washington, DC 20230
202-482-2048
www.ntia.doc.gov

U.S. Department of Labor
Secretary's Commission on Achieving Necessary Skills (SCANS)
200 Constitution Avenue, NW
Washington, DC 20210
www.ttrc.doleta.gov/SCANS

Virtual Enterprise Center
Martin Luther King, Jr. High School
122 Amsterdam Avenue
New York, NY 10023
212-769-2710
www.nycps.k12.ny.us/~ve

VisionLink
88 Thornton Road
Waltham, MA 02154
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www.visionlink.org

Workforce Silicon Valley
95 South Market Street, Suite 660
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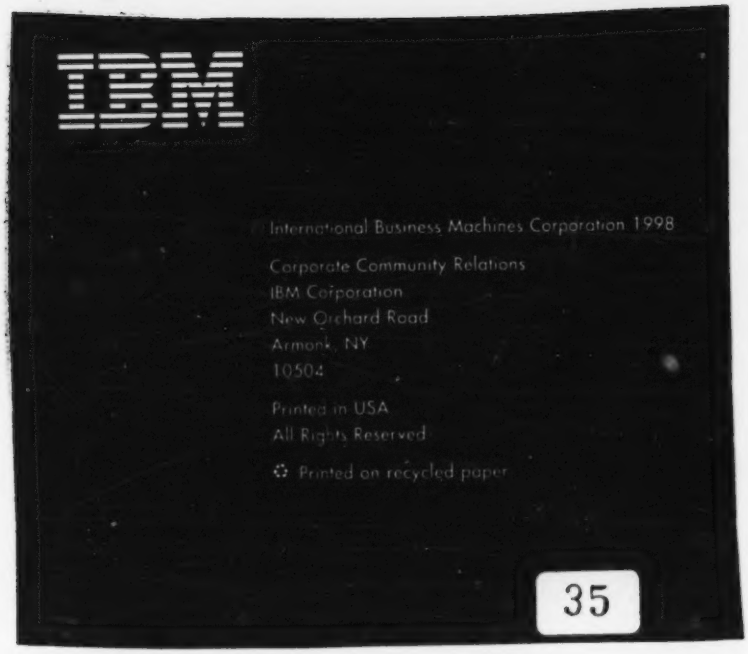

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